We are IntechOpen, the world's leading publisher of Open Access books Built by scientists, for scientists

4,800
Open access books available

122,000
International authors and editors

135M
Downloads

Our authors are among the

154
Countries delivered to

TOP 1%
most cited scientists

12.2%
Contributors from top 500 universities

CLARIVATE ANALYTICS BOOK CITATION INDEX INDEXED

WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?
Contact book.department@intechopen.com

Numbers displayed above are based on latest data collected.
For more information visit www.intechopen.com

Chapter

Correlates of Caesarean Section Delivery in West Bengal, India: An Analysis Based on DLHS-3

Rayhan SK and Somdutta Barua

Abstract

It has been well recognised that medically unnecessary caesarean section (C-section) delivery could increase morbidity risks for both the mother and her child and also could put strain on both institutional and individual assets mainly in developing countries. The present study tried to assess the variations in C-section delivery rates by women's background characteristics and to examine the factors associated with C-section delivery in West Bengal—a state of India. Data from the third round of the District Level Household and Facility Survey (DLHS-3) 2007–2008, covering 6447 ever-married women of age 15–49 years, were used. The results reveal that about 12% women delivered their babies by C-section irrespective of place of delivery, but it rose to about 24% in only institutional delivery. It is also found that the rate of C-section delivery was excessively high in private health facilities (55.8%) followed by higher educated women (50.4%) and for health insurance (36.4%), and antenatal care service eight or more times (36%). The results of predicted (adjusted) probability computed from logistic regression reveal that delivery in private health facilities, higher maternal age, lower birth order and higher level of education were the main influential factors of C-section delivery.

Keywords: antenatal care (ANC), place of delivery, caesarean section delivery, West Bengal, India

1. Introduction

The operation for caesarean delivery constitutes a major surgical procedure. There are a large number of adverse effects on women and infants after the C-section delivery. Study found that C-section delivery is associated with a higher risk of ureteral tract and vesical damage, hysterectomy, abdominal pain, maternal mortality, uterine rupture in future pregnancies, neonatal respiratory morbidity, placenta previa and foetal death [1]. It was revealed that women who delivered their baby by elective C-section have 2.84 times more chance of maternal death than women who delivered their baby normally [2]. A study from Africa found that C-section delivery is associated with stillbirths, neonatal deaths and neonatal morbidity [3]. C-section delivery individually minimises the overall risk to foetus death from the breech birth presentations, although it raises the risk of severe neonatal and maternal morbidities and mortality in cephalic presentation [4]. Women who delivered their first baby by C-section have slightly higher long-term morbidity

than those women delivered their baby normally [5]. A study from Mexico revealed that children born by C-section are less likely to receive breastfeeding than the children born normally [6]. There is also evidence from highly developed countries that C-section is associated with adverse psychosocial results, for example, dissatisfaction, distress and problem with woman and child bonding [7]. Another study demonstrated that caesarean childbirths lead to higher financial burden than vaginal deliveries [8].

In this regard, the World Health Organization (WHO) issued an agreement proclamation in 1985, stating that, "There is no justification for any region to have C-section (CS) rates higher than 10–15%" [9]. But there is considerable debate about whether CS rates over 15% mean an over-utilisation of the procedure. But it is true that "as with any surgery, caesarean sections are associated with short and long term risk which can extend many years beyond the current delivery and affect the health of the woman, her child, and future pregnancies. These risks are higher in women with limited access to comprehensive obstetric care" [10]. According to the District Level Household and Facility Survey (DLHS), the average C-section rate in West Bengal was 11.8% in DLHS-3, 2007–2008 [11], and it also varied from district to district in West Bengal. There was interdistrict variation in C-section rates in West Bengal with Kolkata having the highest C-section rate (34.1%), and Malda having the lowest C-section rate (only 1.8%) in DLHS-3, 2007–2008 [11]. The rate of C-section increased significantly from 3.4% in DLHS-2, 2002–2004 [12], to about 12% in DLHS-3, 2007–2008, and again it rose to 22% (Factsheet DLHS-3, 2012–2013) [13], which was a matter of concern.

The present study was based on the following four observations which were conceptualised by Leone et al. [14]: *first*, recent increasing trends in C-section delivery in West Bengal; *second*, evidence that medically unnecessary C-section could increase morbidity risks for both the woman and her child; *third*, unnecessary medical interventions and C-section could put strain on both institutional and individual assets; *fourth*, evidence from more developed countries demonstrates that C-section delivery is associated with adverse psychosocial outcomes such as distress, dissatisfaction and problems with maternal-infant bonding. On the basis of these observations, the present study tried to explore variations in C-section delivery rates by women's background characteristics and to examine the factors influencing the C-section delivery in West Bengal—a state of Eastern India. The findings of this study could be helpful for policymakers and planning to improve women's health and to make appropriate use of healthcare resources.

This study surveyed the existing studies and tried to find out the associated non-clinical factors of C-section delivery for selecting the relevant independent factors for the present analysis. Among maternal factors, previous studies found that the probability of having C-section delivery increases with the increase in maternal age [15–18]; the likelihood of having C-section delivery decreases with the increase in parity [19–21]. Among socioeconomic factors, existing studies showed that the probability of having C-section delivery increases with the increase in the maternal level of education [16, 22, 23]; with the increase in the level of income, the probability of having C-section delivery also increases [24, 25]; urban women tend to have more C-section delivery than rural women [26, 27]. Among institutional factors, previous studies found that the type of hospitals and number of antenatal care (ANC) visits play a vital role for C-section delivery. Delivering in private health facilities has higher tendency to undergo C-section delivery than delivering in public hospitals [20, 28–31]. The likelihood of C-section delivery increases with the increase in number of ANC visits [19, 21, 32]. Women who have health insurance are more likely to have C-section delivery than women who do not have any health insurance [33, 34].

2. Data and methods

The present analysis was based on the data from the third round of the District Level Household and Facility Survey, carried out during December 2007–2008 in India (DLHS-3, 2007–2008). The District Level Household and Facility Survey was a countywide survey covering 601 districts of India [11]. This survey was designed to gather information at the district level on different aspects of women's healthcare utilisation for Reproductive and Child Health (RCH) including accessibility to the health facilities and to evaluate the health facility capacity and readiness regarding infrastructure. DLHS-3 surveyed a sum of 22213 households and 21878 ever-married women in West Bengal. However, this study was based on 6447 ever-married women of age 15–49 years who had given live birth between January 1, 2004, and the survey date. This was the third round of data which were in the public domain.

2.1 Outcome variable

The outcome or dependent variable was C-section delivery; a dichotomous variable was coded as "1" for yes and "0" for no, or, simply, those women aged 15–49 years who delivered their last live birth after January 1, 2004, by surgical procedure were coded as "1", and those women aged 15–49 years who delivered their last live birth after January 1, 2004, by natural process/vaginally or with assistance or instrument were coded as "0".

2.2 Explanatory variables

The C-section delivery is an outcome of demographic, socioeconomic, insurance status and institutional factors. Among demographic factors, maternal age at last birth (below 20, 20–24, 25–29 and 30+ years) and birth order (first birth order, second birth order and third birth order or above) were taken. The level of mother's education (no schooling, up to 5 years, 6–10 years, 11+ years), household wealth index (poor, middle and rich), religion (Hindus, Muslims and others), caste/tribe (Scheduled Caste (SC), Scheduled Tribe (ST) and others or general) and place of residences (rural and urban residence) were taken from socioeconomic factors. Coverage by health insurance scheme (yes, no) was also included as an explanatory variable. Antenatal care services include the number of ANC visits (up to three times, four to seven times and eight or more times) and places of ANC services (no ANC visits, only public health facilities, only private health facilities, public/private health facilities, and home or elsewhere), and the place of delivery (public health facilities, private health facilities) were taken from institutional factors.

2.3 Statistical analysis

The differences in C-section delivery by women's background characteristics were gross differentials and had been obtained through bivariate analysis. As a number of factors were strongly associated with each other, there was the possibility of confounding. Therefore, it was necessarily desirable to detect the net effect. For this purpose, logistic regression model had been used. In this model, the coefficient (B) and odds ratio (Exp B) were estimated. In order to assess the true differences, it was desirable to obtain adjusted probabilities; by that one can see the actual difference in probabilities [35]. The adjusted probabilities were computed from the coefficients of logistic regression analysis for C-section delivery. A p-value of less than and equal to 0.05 was considered as the significant association between independent variable and outcome variable.

3. Results

Table 1 presents the results of bivariate analysis of C-section delivery rates, by the place of delivery, among all deliveries and all institutional deliveries by the women's background characteristics. From **Table 1**, it was found that among all deliveries, about 12% of women delivered their last birth by C-section, while it was about 24% among all institutional deliveries. And by place of delivery, it was 58.8 and 15.2% for private and public hospitals, respectively. Among all deliveries, it was observed that the proportion of C-section delivery increased with the increases in the maternal age, while the rate of C-section delivery decreased with the increases in birth order. With an increase in the number of ANC visits, the proportion of C-section delivery also increased. The proportions of C-section delivery were higher for receiving ANC services at only private hospitals and for receiving ANC services at both the private and public hospitals than the categories of not receiving any ANC services, receiving it at home and receiving it at public hospitals only. With the increase in the mother's level of education and household's income, the rates of C-section delivery also increased. The percent of C-section delivery was relatively higher for Hindus than that of Muslims and other minor religious groups. Also, the rate of C-section delivery was higher for other categories (general or non-deprived population) than the deprived communities, that is, Scheduled Caste (SC) and Scheduled Tribe (ST). As compared with rural areas, C-section delivery rate was higher for urban areas. Further, the rate of C-section delivery was quite higher for the women who had health insurance than those who had not. However, the rate of C-section delivery was excessively high for the women who delivered their babies in private health facilities (55.8%) followed by the women who attained higher secondary or more education (50.4%), women who had health insurance (36.4%), women who had received antenatal care service eight or more times (36%), women who had received ANC service in only private health facilities (30.4%) and women who lived in urban areas (29.7%). Besides, women who had only one child, received ANC service four to seven times, received ANC service in both public health facilities and private health facilities, attained upper primary or secondary education and delivered their infants in public health facilities present above 15% of C-section delivery rate in West Bengal. On the other hand, the rates of caesarean delivery were very low, which was lower than 5% for the women who had three children, women who did not receive any ANC service, women who received ANC service at home or elsewhere, illiterate women, poor women and tribal women.

Table 2 presents the results of the logistic regression analysis and adjusted probabilities which were computed from the coefficients of logistic regression analysis for C-section delivery. The logistic regression analysis included only the women (unweighted no. = 3149) of age 15–49 years who had given live birth in any health facilities since January 1, 2004, in West Bengal because performing of C-section is possible only in health institutions. Women's background characteristics, utilisation of antenatal care and delivery care service were considered as independent variables, and the type of delivery (normal delivery or C-section delivery) was taken as a dependent variable in this analysis. The actual probability of C-section delivery was 24.1% (weighted) for all the women who had given live birth in any health facilities. The results showed that the place of delivery and number of ANC visits were the significant factors of C-section delivery among institutional factors; maternal age and birth order were the significant factors of C-section delivery among demographic factors; and the level of maternal education was the only one factor significantly associated with the C-section delivery among socioeconomic factors. Delivery in private health facility was the strongest predictor of C-section delivery after controlling for other variables. The adjusted probability of having

Background characteristics	C-section delivery rate (%)					Number of women	
	Place of delivery			All deliveries	All institutional deliveries	Weighted	Unweighted
	Public #	Private #	Home/ elsewhere				
Age							
<20 years	11.5	43.8	0	**8.4**	**16**	1756	1759
20–24 years	15.9	56.4	0	**12.5**	**24.9**	2723	2727
25–29 years	18	62.1	0	**14.3**	**30.3**	1321	1323
30+ years	21.5	58.8	0	**13.3**	**34.3**	637	638
Birth order							
1	18.9	57.4	0	**19.6**	**28.5**	2505	2502
2	13.3	57.7	0	**10.5**	**22.4**	2029	2029
3+	7.5	39.7	0	**3.1**	**12**	1904	1916
No. of ANC visits							
Up to 3 times	11.4	43.6	0	**5.3**	**15.4**	3640	3658
4–7 times	16.6	55	0	**16.7**	**26.1**	2281	2278
8+ times	25.2	68.4	0	**36**	**42.8**	517	511
Place of ANC visits							
No ANC visits	22.9	0	0	**3.1**	**20**	258	259
Only public #	12.3	47	0	**6**	**14.5**	3675	3687
Only private #	22.8	57.3	0	**30.4**	**41.4**	970	967
Public/private #	17.5	58.4	0	**17**	**27.1**	1369	1368
Home/elsewhere	12	66.7	0	**3**	**17.9**	167	166
Education							
No schooling	10.6	32.2	0	**3.7**	**12.6**	2218	2236
Up to 5 years	12.1	42.2	0	**6.7**	**15.9**	1696	1701
6–10 years	16.3	54.7	0	**16.9**	**25.4**	2105	2094
11+ years	35.4	69.7	0	**50.2**	**54**	419	416
Income (wealth index)							
Poor	9.6	58.5	0	**3.8**	**13.2**	1929	1945
Middle	11.8	44.1	0	**6.8**	**15.7**	2776	2779
Rich	22.4	59	0	**28.9**	**35.6**	1733	1723
Religion group							
Muslims	15.9	45.5	0	**6.9**	**20.9**	1976	1988
Hindus	15	57.9	0	**14.1**	**24.9**	4368	4365
Others	19.2	37.5	0	**8.6**	**23.5**	93	94
Social group							
Scheduled Caste	12	50.4	0	**8.2**	**17.1**	1953	1964
Scheduled Tribe	11.3	41.2	0	**4.4**	**14.3**	545	548
Others	17.4	57.5	0	**14.7**	**28.1**	3940	3935
Place of residence							
Rural	12.4	54.9	0	**8.7**	**20**	5466	5474
Urban	25.5	57.4	0	**29.7**	**36.4**	972	973

Background characteristics	C-section delivery rate (%)					Number of women	
	Place of delivery			All deliveries	All institutional deliveries	Weighted	Unweighted
	Public #	Private #	Home/ elsewhere				
Insurance coverage							
No	14.9	55.2	0	**11.1**	**23.1**	6254	6263
Yes	29	61	0	**36.4**	**45.9**	184	184
All	**15.2**	**55.8**	**0**	**11.8**	**24.1**	**6438**	**6447**

Note: # = type of health facilities
Sources: Computed from DLHS-3 data files.

Table 1.
C-section delivery rates by women's background characteristics, antenatal care service and place of delivery in West Bengal, DLHS-3, 2007–2008.

Background characteristics	No. of women	B	Odds ratio	Unadjusted probabilities (in percent)	Predicted probabilities (in percent)
Institutional factors					
Place of delivery					
Public health facilities®	2460	0	0	15.2	18.3
Private health facilities	689	1.4839	4.4***	55.8	49.6***
Place of ANC services					
No ANC visits®	40	0	0	20	32.6
Only public health facilities	1516	−0.577	0.5767	14.5	21.6
Only private health facilities	709	−0.399	0.68	41.4	24.8
Public and private	856	−0.323	0.724	27.1	26
Home/elsewhere	28	−0.31	0.734	17.9	26.2
No. of ANC visits					
Up to 3 times®	1260	0	0	15.4	21.1
4–8 times	1459	0.1878	1.194	26.1	24.2
8+ times	430	0.4545	1.6**	42.8	29.5**
Demographic factors					
Age					
<20 years®	921	0	0	16	16.7
20–24 years	1363	0.4766	1.6***	24.9	24.2***
25–29 years	620	0.8215	2.3***	30.3	31.1***
30+ years	245	0.932	2.5***	34.3	33.7***
Birth order					
1®	1713	0	0	28.5	29.8
2	944	−0.451	0.64***	22.4	21.3***
3+	492	−1.166	0.3***	12	11.7***

Background characteristics	No. of women	B	Odds ratio	Unadjusted probabilities (in percent)	Predicted probabilities (in percent)
Socioeconomic factors					
Education					
No schooling®	655	0	0	12.6	19.8
Up to 5 years	716	0.1659	1.172	15.9	22.4
6–10 years	1392	0.251	1.2985	25.4	24.1
11+ years	386	0.6437	1.9**	54	31.8**
Income (Wealth index)					
Poor®	557	0	0	13.2	23.7
Middle	1196	−0.133	0.882	15.7	21.5
Rich	1396	0.091	1.1095	35.6	25.4
Religion group					
Muslims®	652	0	0	20.9	25.9
Hindus	2463	−0.154	0.8657	24.9	23.1
Others	34	−0.373	0.6989	23.5	19.4
Social group					
Scheduled Caste®	938	0	0	17.6	22.8
Scheduled Tribe	168	−0.099	0.9219	14.3	21.4
Others	2043	0.0875	1.078	14.7	24.2
Place of residence					
Rural®	2360	0	0	8.7	22.6
Urban	789	0.214	1.2439	29.7	26.6
Insurance coverage					
No®	3003	0	0	23.1	23.6
Yes	146	−0.053	0.9549	45.9	22.7

Note: The analysis is based on institutional delivery, (no. of unweighted cases = 3149).
The actual probability of C-section delivery in health facilities is about 24% (24.1%, weighted); Cox & Snell R Square = 0.178, Nagelkerke R Square = 0.266; ® Reference category.
**Significant level at 0.05*
***Significant level at 0.01*
****Significant level at 0.001*
Sources: Computed from DLHS-3 data files.

Table 2.
Predicted (adjusted) probabilities of C-section delivery in West Bengal, computed from logistic regression, DLHS-3, 2007–2008, India.

C-section in private health facilities was 49.6%; that was almost three times higher than public health facilities (18.3%). The place of ANC services did not seem to have a very clear effect on C-section delivery, but the frequency of antenatal visits had a mild effect on C-section delivery; it was mostly found at higher number of ANC visits. The probability of C-section delivery for the older women was higher than younger women after controlling for other variables. With the increase in maternal age, the chances of having C-section delivery also increased. The birth order also was one of the strongest predictors of C-section delivery. With the increase in birth order, the probability of having C-section decreased, which was in the opposite direction to the maternal age. The effect of education was observed,

which was mostly found at the higher level of education. A small variation in the probability of C-section delivery was observed between the rural and urban residences, but it was an insignificant factor after controlling for others. The effect of level of income on C-section delivery was mild, so were the effects of religion and caste. Besides, the insurance coverage did not show any significant effect on C-section delivery in this analysis, although it had a large gross effect on C-section delivery in bivariate analysis.

4. Discussion

This study showed that the actual probability of C-section delivery was about 12% among all deliveries and 24% among all institutional deliveries in West Bengal. The results of logistic regression revealed that the place of delivery, the number of ANC visits, maternal age, birth order and the level of maternal education were the significant factors associated with the C-section delivery. Delivery in private health facilities was the strongest predictor of C-section delivery as expected. This finding is consistent with the findings of previous studies [14, 17, 20, 28, 29, 36, 37]. This finding could be explained in various ways. Firstly, the proprietors of private health facilities are revenue oriented, and they always try to encourage doctors to perform C-section delivery instead of normal delivery because it brings more revenue; secondly, many doctors are also financially motivated and, therefore, advise patients to have C-section; thirdly, generally doctors are very busy persons, engaged in multiple tasks, and, thus, often they perform C-section even before the arrival of the delivery's labour pain, so as to avoid patient call; and fourthly, both doctors and proprietors of private health facilities do not take risks regarding delivery, so doctors perform C-section before the arrival of the actual delivery's labour pain for avoiding any risks. The higher maternal age was also another important significant factor of C-section delivery. This finding is found to be significant in almost all the previous studies [18, 26, 31, 38, 39]. The higher age of women is much more associated with the prolonged labour, unable to progress at the time of birth and foetal distress which could lead to C-section delivery. Birth order (parity) was also another significant factor of C-section delivery. This finding is similar to a large number of studies [15, 27, 40–43]. The pregnancy and delivery complications are higher among the primiparous women or women of lower birth order than women of higher birth order which leads to higher chances of C-section delivery. On the other hand, maternal age and birth order are highly correlated with each other. The probability of having C-section of lower birth order is higher, but once the birth order is controlled, then higher age has greater chances of C-section delivery. So, women of higher age with the low birth order have higher chances to have C-section delivery. Another most important factor of C-section delivery was the level of woman's education. This finding is also consistent with a large number of previous studies [25, 32, 34, 42, 44, 45]. In general, highly educated women are more aware of maternal and child health and quality of care which would lead women to prefer to go to private health facilities for delivering and ultimately lead to have C-section delivery. The higher number of antenatal visits was the significant factor of C-section delivery as expected though the effect was mild. This finding is also consistent with other studies [22, 26, 29, 30, 46]. The higher number of ANC visits might be the result of pregnancy complications which indicates the surgical operation to deliver a baby. The place of residence was not a significant factor in this study. A similar finding has been observed in the study of Kerala, India [31], and in Jordon [47]. These studies argue that well connectivity and availability of health

facilities across the state might be the possible reasons for this finding. The level of income, religion, caste systems and insurance coverage did not show a significant effect on C-section delivery.

5. Conclusions

From the above analysis, the present study revealed that women's demographic, socioeconomic background characteristics, antenatal care service and delivery care can have an effect on C-section delivery. From the findings of the present study, it could be recommended that there are some steps which may help to reduce or stop the medically unnecessary C-section delivery for the betterment of women and child health and appropriate use of resources. First, it is found that the rates of C-section delivery were almost three times higher in private health sectors than the public health sectors. Therefore, universal guidelines, protocols and medical audit on C-section should be implemented. Further, the public health system should take steps to monitor the reasons of C-section delivery. The results revealed that women at higher age were at more risk for C-section delivery. The results also found that higher educated women were more tend to have C-section delivery. Thus, the maternal and child health-related educational programme should be implemented for educated women as well as uneducated women. Finally, the community health workers should be trained to circulate the awareness about risks and benefits of C-section delivery, so that medically unnecessary C-section deliveries are not requested or demanded by women and their families. One major limitation of this study is that, in the data source (DLHS, 2007–2008), there is no information on whether the C-section delivery was medically indicated or not. Thus, further studies are needed to examine the factors for medically indicated C-section delivery and medically unindicated C-section delivery separately.

Acknowledgements

We are very grateful to Prof. P.M. Kulkarni for his overall supervision and the Centre for the Study of Regional Development, Jawaharlal Nehru University, for providing the facility to access various journals.

Conflict of interest

The authors have no conflicts of interest to declare.

Funding statement

No funding was obtained for this paper.

Ethical statement

No ethical approval was needed for this paper.
Consent for publication.
Not applicable.

Availability of data and materials

This study is based on secondary data which was available in public domain.

Abbreviations

ANC	antenatal care
CS	caesarean section/C-section
DLHS	District Level Household and Facility Survey
IIPS	International Institute for Population Sciences
WHO	World Health Organization

Author details

Rayhan SK* and Somdutta Barua
Centre for the Study of Regional Development, School of Social Sciences, Jawaharlal Nehru University, New Delhi, India

*Address all correspondence to: rayhangog@gmail.com

References

[1] Belizan JM, Althabe F, Cafferatat ML. Health consequences of the increasing caesarean section rates. Epidemiology. 2007;**18**:485-486

[2] Betrán AP, Merialdi M, Lauer JA, Bing-shun W, Thomas J, Look PV, et al. Rates of caesarean section: Analysis of global, regional and national estimates. Paediatric and Perinatal Epidemiology. 2007;**21**:98-113

[3] Shah A, Fawole B, M'Imunya JM, Amokrane F, Nafiou I, Wolomby J, et al. Cesarean delivery outcomes 97 from the WHO global survey on maternal and perinatal health in Africa. International Journal of Gynecology and Obstetrics. 2009;**107**(3):191-197

[4] Villar J, Carroli G, Zavaleta N, Donner A, Wojdyla D, Faundes A, et al. Maternal and neonatal individual risks and benefits associated with caesarean delivery: Multicentre prospective study. British Medical Journal. 2007;**335**:1025-1029

[5] Hemminki E. Long term maternal health effects of caesarean section. Journal of Epidemiology and Community Health. 1997;**45**:24-28

[6] Perez-Escamilla R, Maulen-Radovan I, Dewey KG. The association between cesarean delivery and breast-feeding outcomes among Mexican women. American Journal of Public Health. 1996;**86**(6):832-836

[7] Lobel M, DeLuca RS. Psychosocial sequelae of caesarean delivery: Review and analysis of their causes and implications. Social Science and Medicine. 2007;**64**:2272-2284

[8] Shearer EL. Cesarean section: Medical benefits and costs. Social Science and Medicine. 1993;**37**(10):1223-1231

[9] WHO. Appropriate technology for birth. Lancet. 1985;**2**:436-437

[10] WHO. WHO Statement on Caesarean Section Rates. 2014. pp. 1-8. Available from: www.Who.Int/Reproductivehealth/

[11] International Institute for Population Sciences (IIPS). District Level Household and Facility Survey (DLHS-3), 2007-08. Mumbai, India: IIPS; 2010

[12] International Institute for Population Science (IIPS) and Macro International. District Level Household and Facility Survey (DLHS-2), 2002-04. Mumbai, India: IIPS; 2007

[13] International Institute for Population Sciences (IIPS). District Level Household and Facility Survey (DLHS-4), 2012-13, Factsheets. Mumbai, India: IIPS; 2014

[14] Leone T, Padmadas SS, Matthews Z. Community factors affecting rising caesarean section rates in developing countries: An analysis of six countries. Social Science and Medicine. 2008;**67**: 1236-1246

[15] Chacham AS, Perpetuo IHO. The incidence of caesarean deliveries in Belo Horizonte, Brazil: Social and economic determinants. Reproductive Health Matters. 1998;**6**:115-121

[16] Henke RM, Wier LM, Marder WD, Friedman BS, Wong HS. Geographic variation in cesarean delivery in the United States by payer. BMC Pregnancy and Childbirth. 2014;**14**:387

[17] Hopkins K, Amaral E. The role of nonclinical factors in cesarean section rates in Brazil. In: Conference Population Association of America, Philadelphia, UAS; 2005. Available from: http://paa2005.princeton.edu/papers/50741

[18] Stewart-Hall K. An analysis of risk factors associated with high rates

of cesarean births in three selected Northeast Tennessee hospitals (Unpublished master's thesis). Tennessee, USA: East Tennessee State University; 2000

[19] Huang K, Tao F, Faragher B, Raven J, Tolhurst R, Tang S, et al. A mixed-method study of factors associated with differences in caesarean section rates at community level: The case of rural China. Midwifery. 2013;**29**:911-920

[20] Kassak KM, Mohammad AA, Abdallah AM. Opting for a caesarean: What determines the decision? Public Administration and Management. 2009;**13**:100-122

[21] Tebeu PM, Mboudou E, Halle G, Kongnyuy E, Nkwabong E, Fomulu JN. Risk factors of delivery by caesarean section in Cameroon (2003-2004): A regional hospital report. ISRN Obstetrics and Gynecology. 2011;**2011**:1-5

[22] Lee SI, Khang YH, Yun S, Jo MW. Rising rates, changing relationships: Caesarean section and its correlates in South Korea, 1988-2000. BJOG. 2005;**112**:810-812

[23] Parazzini F, Pirotta N, La Vecchia C, Fedele L. Determinants of caesarean section rates in Italy. British Journal of Obstetrics and Gynecology. 1992;**99**:203-206

[24] Kambale Mastaki J. Social predictors of caesarean section births in Italy. African Health Sciences. 2012;**11**:560-565

[25] Prakash KC, Neupane S. Cesarean deliveries among Nepalese mothers: Changes over time 2001-2011 and determinants. Archives of Gynecology and Obstetrics. 2014;**289**(2):421-427

[26] Khawaja M, Kabakian-Khasholian T, Jurdi R. Determinants of caesarean section in Egypt: Evidence from the demographic and health survey. Health Policy. 2004;**69**(3):273-281

[27] Yassin K, Saida G. Levels and determinants of caesarean deliveries in Egypt: Pathways to rationalization. The Internet Journal of World Health and Societal Politics. 2012;**7**(2):1-13

[28] Gebremedhin S. Trend and socio-demographic differentials of Caesarean section rate in Addis Ababa, Ethiopia: Analysis based on Ethiopia demographic and health surveys data. Reproductive Health. 2014;**11**:14

[29] Mishra US, Ramanathan M. Delivery-related complications and determinants of caesarean section rates in India. Health Policy and Planning. 2002;**17**:90-98

[30] Neuman M, Alcock G, Azad K, Kuddus A, Osrin D, More NS, et al. Prevalence and determinants of caesarean section in private and public health facilities in underserved South Asian communities: Cross-sectional analysis of data from Bangladesh, India and Nepal. BMJ. 2014;**4**(12):e005982

[31] Padmadas SS, Kumar S, Nair SB, Kumari A. Caesarean section delivery in Kerala, India: Evidence from a National Family Health Survey. Social Science and Medicine. 2000;**51**:511-521

[32] Klemetti R, Che X, Gao Y, Raven J, Wu Z, Tang S, et al. Cesarean section delivery among primiparous women in rural China: An emerging epidemic. American Journal of Obstetrics and Gynecology. 2010;**202**:65

[33] Gama SGND, Viellas EF, Schilithz AOC, Filha MMT, Carvalho MLD, Gomes KRO, et al. Factors associated with caesarean section among primiparous adolescents in Brazil, 2011-2012. Cadernos de Saúde Pública. 2014;**30**:S1-S11

[34] Tang S, Li X, Wu Z. Rising caesarean delivery rate in primiparous women in urban China: Evidence from three nationwide household health surveys. The American Journal of Obstetrics and Gynecology. 2006;**195**:1527-1532

[35] Retherford RD, Choe MK. Statistical Model for Causal Analysis. New York, INC: John Wiley and Sons; 1993

[36] Guihard P, Blondel B. Trends in risk factors for caesarean sections in France between 1981 and 1995: Lessons for reducing the rates in the future. British Journal of Obstetrics and Gynaecology. 2001;**108**:48-55

[37] Mossialos E, Allin S, Karras K, Davaki K. An investigation of caesarean sections in three Greek hospitals. The impact of financial incentives and convenience. European Journal of Public Health. 2005;**15**:288-295

[38] Abdul-Rahim HF, Abu-Rmeileh NME, Wick L. Cesarean section deliveries in the occupied Palestinian territory (oPt): An analysis of the 2006 Palestinian Family Health Survey. Health Policy. 2009;**93**:151-156

[39] Räisänen S, Gissler M, Kramer MR, Heinonen S. Influence of delivery characteristics and socioeconomic status on giving birth by caesarean section—A cross sectional study during 2000-2010 in Finland. BMC Pregnancy and Childbirth. 2014;**14**:120

[40] Gomes UA, Silva AA, Bettiol H, Barbieri MA. Risk factors for the increasing caesarean section rate in Southeast Brazil: A comparison of two birth cohorts, 1978-1979 and 1994. International Journal of Epidemiology. 1999;**28**:687-694

[41] Heredia-Pi I, Servan-Mori EE, Wirtz VJ, Avila-Burgos L, Lozano R. Obstetric care and method of delivery in Mexico: Results from the 2012 National Health and Nutrition Survey. PLoS One. 2014;**9**(8):e104166

[42] Patel RR, Peters TJ, Murphy DJ. Prenatal risk factors for caesarean section. Analyses of the ALSPAC cohort of 12 944 women in England. International Journal of Epidemiology. 2005;**34**:353-367

[43] Rahman M, Ahmad Shariff A, Shafie A, Saaid R, Md Tahir R. Determinants of caesarean risk factor in Northern Region of Bangladesh: A multivariate analysis. Iranian Journal of Public Health. 2014;**43**:16-27

[44] Giani U, Bruzzese D, Pugliese A, Saporito M, Triassi M. Risk factors analysis for elective caesarean section in Campania region, Italy. Epidemiologia e Prevenzione. 2011;**35**(2):101-110

[45] Mostafa Kamal SM. Preference for institutional delivery and caesarean sections in Bangladesh. Journal of Health, Population and Nutrition. 2013;**31**:96-109

[46] Koc I. Increased cesarean section rates in Turkey. The European Journal of Contraception and Reproductive Health Care. 2003;**8**:1-10

[47] Khawaja M, Al-Nsour M. Trends in the prevalence and determinants of caesarean section delivery in Jordan: Evidence from three demographic and health surveys, 1990-2002. World Health and Population. 2007;**9**(4):17-28